

# Modelling Concepts

---

Based on Chapter 5 of Bennett, McRobb and Farmer:

*Object Oriented Systems Analysis and Design Using UML*, (3<sup>rd</sup> Edition), McGraw Hill, 2005.

# In This Lecture You Will Learn:

---

- What is meant by a model
- The distinction between a model and a diagram
- The UML concept of a model

# What is a Model

---

- Like a map, a model represents something else
- A useful model has the right level of detail and represents only what is important for the task in hand
- Many things can be modelled: bridges, traffic flow, buildings, economic policy

# Why Use a Model?

---

- A model is quicker and easier to build
- A model can be used in a simulation
- A model can evolve as we learn
- We can choose which details to include in a model
- A model can represent real or imaginary things from any domain



# Modelling Organizations

---

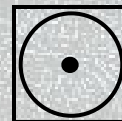
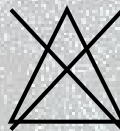
Organizations are human activity systems.

- The situation is complex
- Stakeholders have different views
- We have to model requirements accurately, completely and unambiguously
- The model must not prejudge the solution

# What is a Diagram?

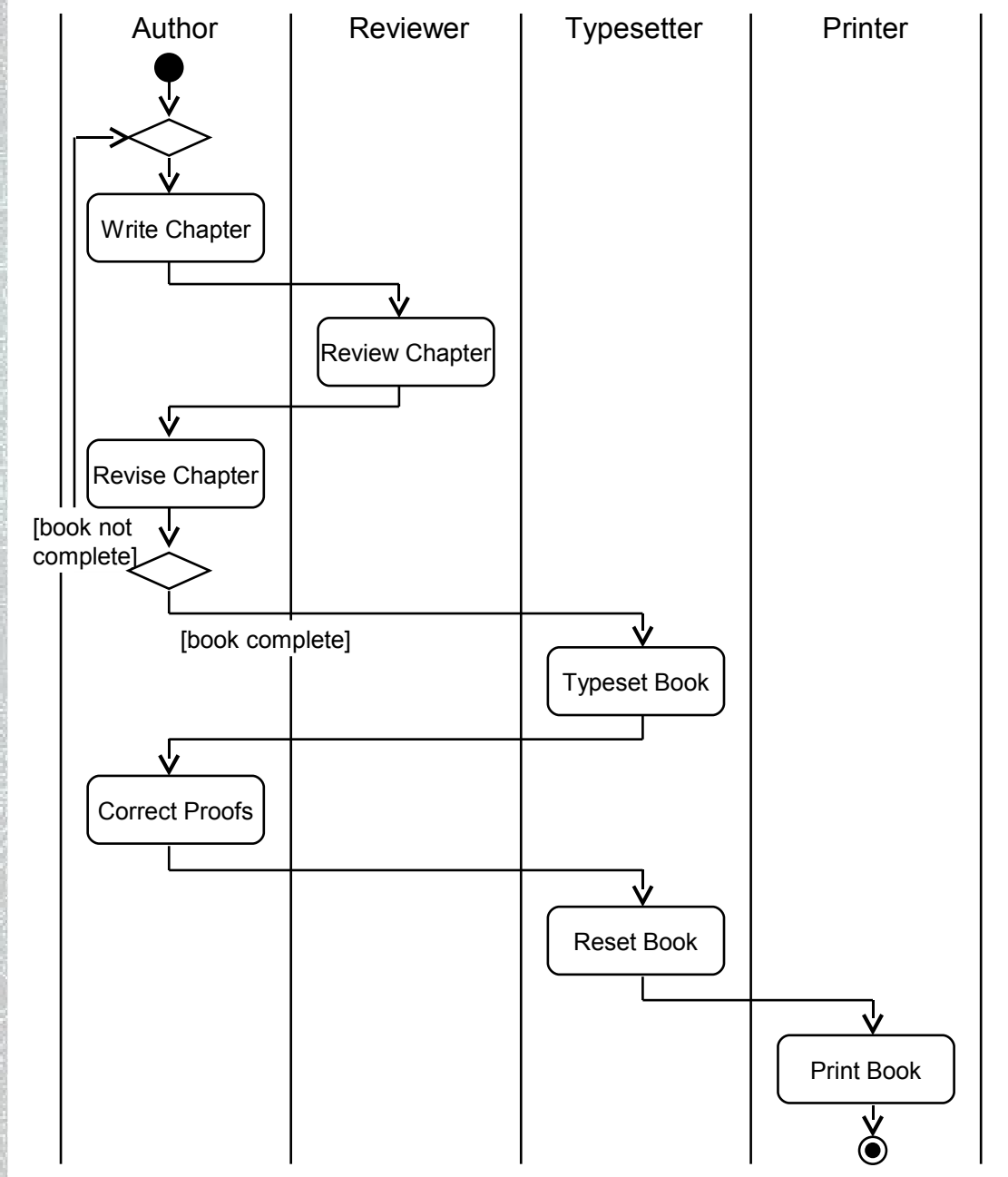
---

- Abstract shapes are used to represent things or actions from the real world
- Diagrams follow rules or standards
- The standards make sure that different people will interpret the diagram in the same way

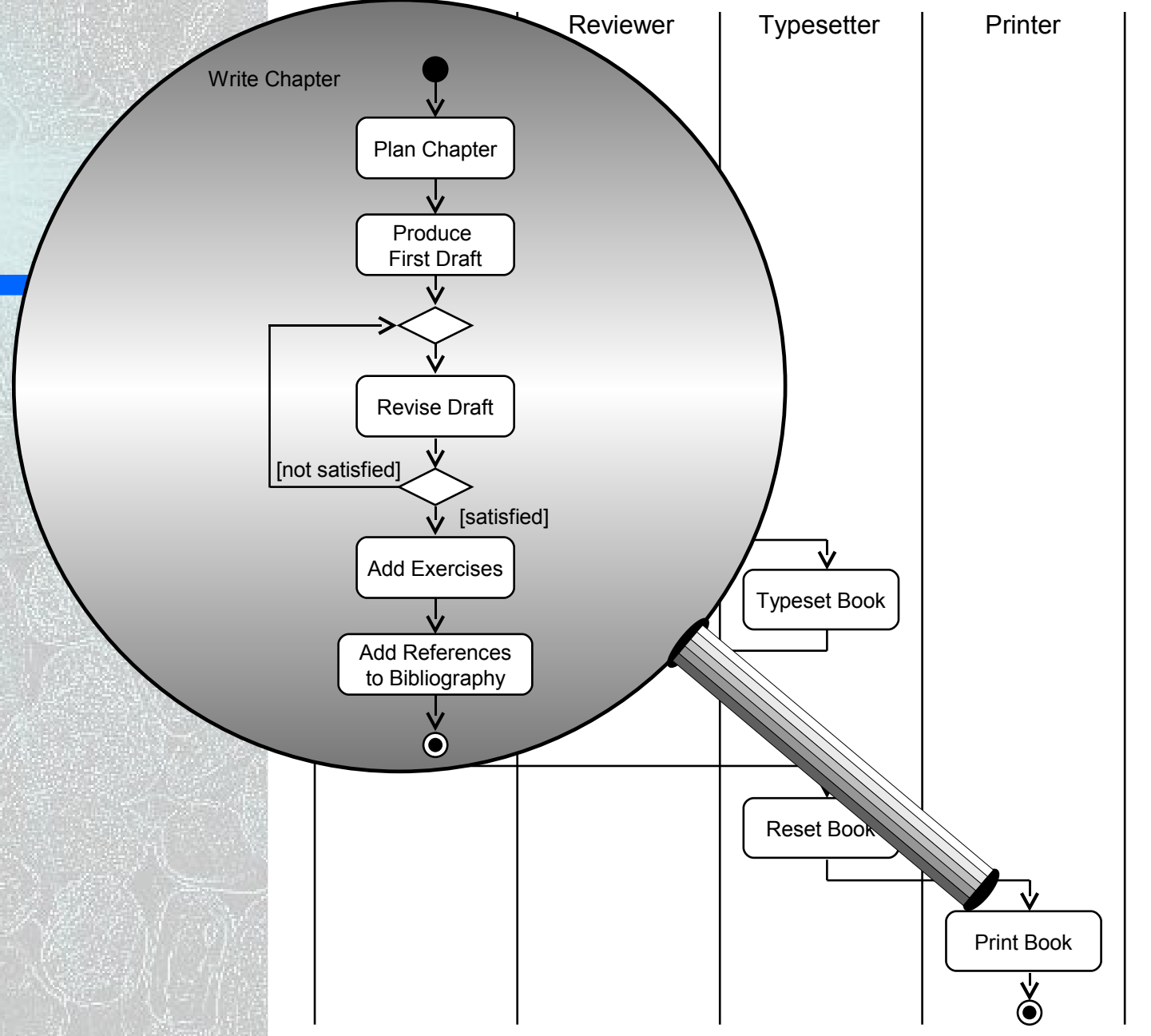


# An Example of a Diagram

- An activity diagram of the tasks involved in producing a book.



# Hiding Detail



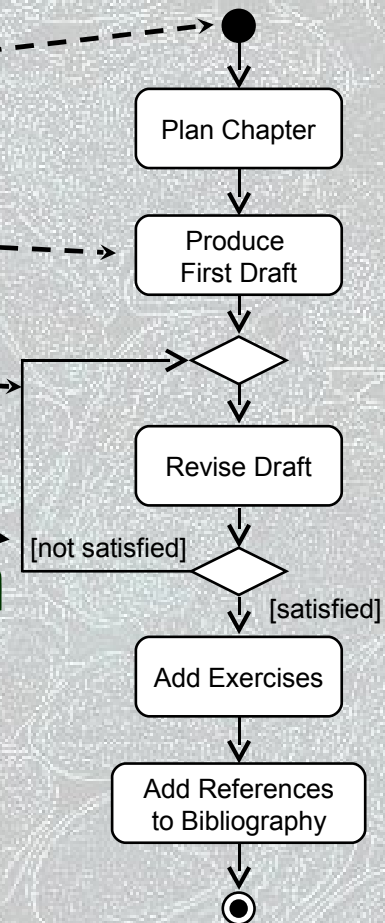


# Diagrams in UML

## ■ UML diagrams consist of:

- icons
- two-dimensional symbols
- paths
- Strings

## ■ UML diagrams are defined in the UML specification.



# Diagrams vs Models

---

- A diagram illustrates some aspect of a system.
- A model provides a complete view of a system at a particular stage and from a particular perspective.
- A model may consist of a single diagram, but most consist of many related diagrams and supporting data and documentation.

# Examples of Models

---

## ■ Requirements Model

- complete view of requirements
- may include other models, such as a Use Case Model
- includes textual description as well as sets of diagrams

# Examples of Models

---

## ■ Behavioural Model

- shows how the system responds to events in the outside world and the passage of time
- an initial model may just use Communication Diagrams
- a later model will include Sequence Diagrams and State Machines



# Models in UML

---

- A system is the overall thing that is being modelled
- A subsystem is a part of a system consisting of related elements
- A model is an abstraction of a system or subsystem from a particular perspective
- A model is complete and consistent at the chosen level of abstraction



# Models in UML

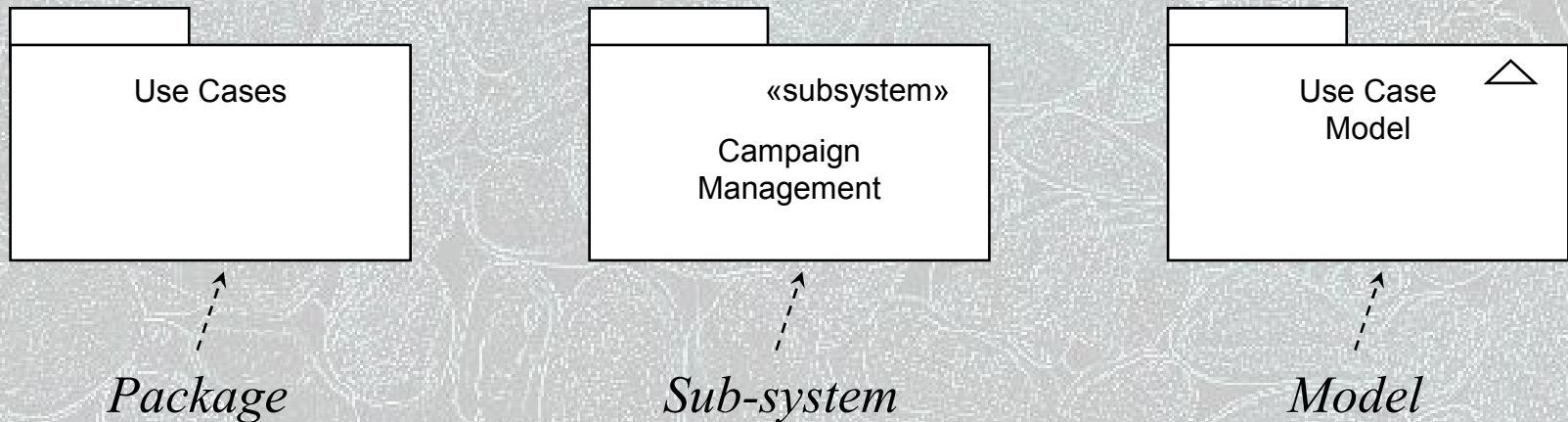
---

- Different models present different views of the system, for example:
  - use case view
  - design view
  - process view
  - implementation view
  - deployment view

(Booch et al., 1999)

# Packages, Sub-systems and Models

- UML has notation for showing subsystems and models, and also for packages, which are a mechanism for organising models (e.g. in CASE tools)



# Developing Models

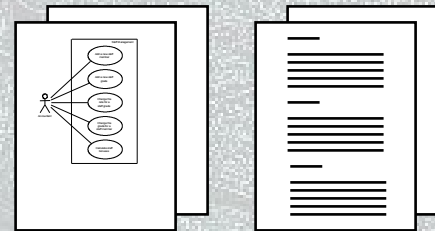
---

- During the life of a project using an iterative life cycle, models change along the dimensions of:
  - abstraction—they become more concrete
  - formality—they become more formally specified
  - level of detail—additional detail is added as understanding improves

# Development of the Use Case Model

## Iteration 1

Obvious use cases.  
Simple use case descriptions.



## Iteration 2

Additional use cases.  
Simple use case descriptions.  
Prototypes.



## Iteration 3

Structured use cases.  
Structured use case descriptions.  
Prototypes.





# Summary

---

In this lecture you have learned about:

- What is meant by a model
- The distinction between a model and a diagram
- The UML concept of a model



# References

---

- Booch, Rumbaugh and Jacobson (1999)
  - Bennett, Skelton and Lunn (2005)
- (For full bibliographic details, see Bennett, McRobb and Farmer)